

## ASSESSMENT OF THE SATISFACTION OF BUS PASSENGERS IN DHAKA, BANGLADESH

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**Abstract**— Increased population results in an increase in travel demand. Greater road length and construction of new roads result in faster and longer travels and increase car ownership, which contributes to increased traffic congestion and pollution. The bus form of travel is a critical component of resolving this issue. A bus can carry 30-40 passenger per trip on the other hand a private car carries 2-3 passengers per trip. So, bus transport could decrease the number of vehicles in road if it can provide better service quality in bus mode. In this experiment, the main objectives are to better understand overall passengers' satisfaction in bus transport in Uttara-Gazipur route and predict the individual factors contributing to the comfort of the bus modes in this route. To evaluate this result, a questionnaire survey form was created with about 19 service quality parameters such as safe speed, temperature, noise, required time, waiting time for bus, station service, seat comfort service, cleanliness, staff behaviour, payment system fare. In this experiment, opinions of 100 passengers were collected regarding the service quality. Data were analyzed using descriptive and multiple linear regression, analyzed by SPSS software. One main finding reported that passengers are not satisfied yet with bus service quality. This study revealed that 75% of feedback was poor or very poor, and 25% of feedback was positive or good regarding the level of satisfaction for bus mode. The regression analysis reported that the overall P-value is less than 0.05 and the regression coefficient, R<sup>2</sup> is 0.64, which rejected the null hypothesis and makes the survey significant to assess the overall comfort of passengers traveling with bus in Uttara-Gazipur route. It was also found that three parameters: reliability ( $\beta = 0.170$ ,  $P=0.027$ ), safe speed ( $\beta = 0.240$ ,  $P = 0.021$ ) and travel time ( $\beta = 0.320$ ,  $P = 0.01$ ) are individually contributing to overall satisfaction of passenger in Uttara-Gazipur route.

**Keywords**— Passenger satisfaction, comfort, bus transportation, transport risk, service quality, public transport.

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### I. INTRODUCTION

Governance understanding and analyzing the expectations and wants of customers is critical to customer satisfaction in public transportation. Designing a service around the consumer's needs is critical to improving the quality of the service [1]. Customer or

passenger needs, such as frequency, convenience, safety, and so on, are critical considerations in the public transportation industry [2]. These passenger needs must be translated into quality requirements using some technique. Customers, for example, have high expectations of service from transportation providers. Operators are then required to develop solutions and modify their quality criteria to

meet that need [3]. In order to meet this passenger demand, the operator needs have a quality factor such as punctuality, regularity, trip time, and so on [4]. Transport firms in the service industry need not only a methodology for figuring out what passengers want and need, but they also need a strategy for turning those expectations into service standards [5].

A transport service is marked by a series of service factors such as comfort, reliability, service programming, etc. Comfort of rides is considered one of the top criteria affecting passenger satisfaction with public transport systems [6][7][8][9][10]. People often do not use public transport (PT) despite having good accessibility due to inconvenience and discomfort [11]. As a result, bus operators and authorities have placed a higher premium on improving bus comfort to attract more people to PT and further reduce traffic congestion [7]. Additionally, identifying factors that affect bus comfort may assist policymakers in implementing focused improvement strategies [12]. Several studies have been conducted to measure the comfort of a public bus in various methods while many theories have been proposed to explain which factors are responsible for affecting it [13]. Public bus comfort studies can be divided broadly into two categories – one is measuring comfort by mechanical approach, and the other is by qualitative approach [14]. In mechanical approach, the variables that may significantly affect comfort are measured using equipment. In the qualitative approach, the perception of various comfort components is collected from (PT) users through a questionnaire survey [15].

The service level is the total measure of all service characteristics that affect users [10]. Travel duration, safe speed, reliability, bus fitness, seating arrangement, station service, fare, payment method, security of goods, driver experience, noise pollution, temperature, seat comfort, cleanliness, and bus personnel behavior are all variables that affect the degree of service [16]. At locations where passengers must wait, amenities for shelter, comfort (i.e., sitting arrangements), and safety are required. As a result, pauses or stations are critical for public transportation [17]. Aside from the physical challenges, public transportation service relies on scheduling, vehicle operation and supervision, fare collection, and maintenance. Line

capacity, service frequency, operating speed, reliability, safety, and productive capacity have all been cited as critical performance components [18]. There are a variety of challenges that affect public transportation operations, including reliability, passenger comfort, and safety [19]. In comparison to private transportation, public transportation (also known as public transit, mass transit, or just transit) is a mode of public transportation for passengers that is often scheduled, operated on set routes, and charges a listed fare for each trip [20]. Public transportation includes city buses, trolleybuses, trams, passenger trains, and fast transit. Intercity public transportation is dominated by airlines, coaches, and intercity rail [21]. Numerous countries throughout the world are developing high-speed rail networks. Most public transit systems operate along defined routes with predetermined embarkation/disembarkation points and on a fixed schedule, with the most frequent services operating at a headway [22]. However, most public transit trips require passengers to walk or take a bus to reach train stations.

Present Dhaka's bus service is failing at an alarming rate. The bus business in Dhaka is unprofitable at the moment [23]. To put it another way, bus owners and operators are failing to reinvest their money in local transportation services as a result of the lack of bus service growth. Drivers fight for passengers by creating obstructions around junctions so that buses can't overtake one other and don't care about passengers' safety while boarding. Dhaka Metro Regional Transport Committee (DMRTC) has issued the route permits to the operator without considering passenger demand or the need for multiple bus operators to operate on the same routes. In the current system, the route permit is typically granted based on a request from the operator. Most bus firms choose to run their vehicles on the busiest routes to maximize profits. This means that most bus firms only run their buses on routes with high profit margins, putting passengers at risk in the process. Airport road alone has roughly 60 bus routes fighting against each other. Operators are losing money due to this unfair competition, and passengers aren't getting the services they need. Business plans are what's causing the most trouble. There are a variety of risks involved in operating a bus service in Dhaka, but the government is not taking any [24]. The fare collection mechanism is also a serious issue. The drivers, conductors, and helpers of transportation service are not paid for their work. Thus, even bus companies rent out their vehicles daily to drivers for a fixed fee. This driver, who hires the bus every day, has only one goal in mind: to make as much money as possible. The

study's main objectives are as follows: (a) To predict the factors affecting or contributing the comfort of the bus modes in Uttara to Gazipur; and (b) To gain a better understanding of overall passengers' satisfaction in public bus transport in Uttara-Gazipur route.

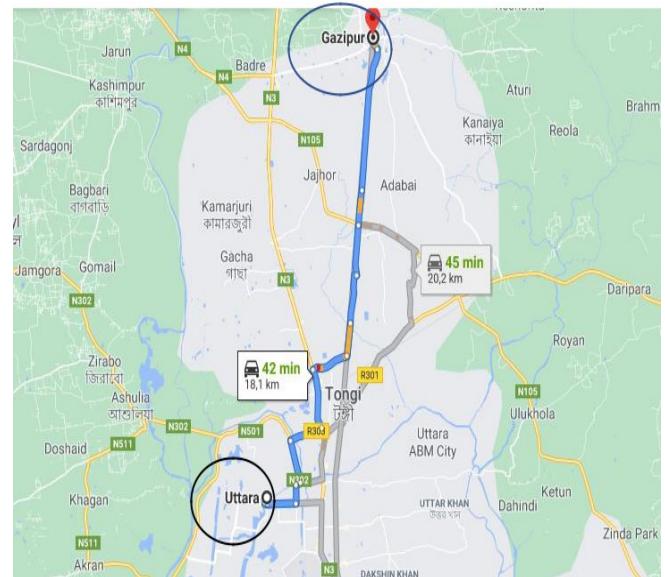
## II. METHODOLOGY

### A. Participants and procedure

The study was conducted upon 100 bus passengers from Uttara-Gazipur route. The study has passed the ethical review of Uttara University, Dhaka, Bangladesh. Passengers were informed about the purpose of the survey before presenting the questionnaire. Subjects participated in an online by messenger and email and filed survey. The survey was administered at January 2021.

### B. Data collection

The data for the research that underpinned this paper are collected using a questionnaire best instrument. The first part consists of general questions like name, email / phone, and route user. The second part covers questions concerning service quality. There are eighteen questions in this part. Each question has five options as like very good, good, satisfaction, poor, very poor. And the last part has the signature of the passengers, which has confirmed the validity of the data. The data were collected from December, 2020 to February 2021. The data has been taken from Uttara-Gazipur route at three station Azompur bus stand, Tongi station road and Board Bazar. This research collected total 100 passenger response from these 50 data collect from online who uses this route and 50 data from bus or station in Uttara-Gazipur route. The map of the route is attached below to better recognition the route. About 60% of the data was collected from passengers standing at different stations and about 40% of the data was collected from passengers boarding various buses. Some have expressed frustration at answering the questions. Some answered the questions with great ease.



**Fig. 1.** Uttara-Gazipur route map view

### C. Multiple linear regression

This manuscript used multiple linear regression (MLR) to analyze the relationship between independent variables: speed, temperature, cleanliness, sound pollution, and dependent variable comfort. The significance level for the regression model is taken as 5%.

MLR model for this study can be expressed using Eq. 2.1

$$y = a + bx_1 + cx_2 + dx_3 + ex_4 + \varepsilon \quad (1)$$

Where,  $y$  = overall comfort,  $x_1$  = safe speed,  $x_2$  = temperature,  $x_3$  = cleanliness,  $x_4$  = sound pollution,  $a$  = intercept,  $\varepsilon$  = error term,  $b, c, d, e$  = regression coefficients.

### D. Significance level

The significance level is defined as the probability of rejecting a null hypothesis by the test when it is really true, denoted as  $\alpha$ . That is,  $P$  (Type I error) =  $\alpha$ . The significance level 0.05 is related to the 95% confidence level [Significance Level, 2021].

### E. Confidence level

A certain percentage of all possible samples are likely to include data from the real population, which is known as the confidence level. All available samples may be taken from the same population, and a confidence interval was

produced for each sample. For example. A 95 percent confidence level suggests that 95 percent of the confidence intervals would contain the genuine publishing parameter.

#### F. Data analysis

After field data collection the collected data were imported and organized into SPSS software. Here total 19 parameters are selected for measuring bus passengers' comfort and descriptive statistics. These questions are,

X1 = Frequency of use these route

X2 = Present preferred quality

X3 = Fitness of bus

X4 = Setting arrangement

X5 = Time required

X6 = Station Service

X7 = Seat comfort

X8 = Cleanliness of bus

X9 = Behavior of bus Staff

X10 = Fare

X11 = Payment system

X12 = Reliability

X13 = Security of goods

X14 = Safe speed

X15 = Driver experience

X16 = Noise pollution

X17 = Air pollution

X18 = Temperature

X19 = Overall satisfactory

From these parameters X1, X2, X3, X4, X5, ..... X18, are chosen as independent variables and X19 is selected for the dependent variable.

## III. RESULTS AND DISCUSSION

### A. Demography of the respondents

This study has selected several passengers' demographic characteristics that are compatible with their bus journey. The selected characteristics are age, gender, and frequency of bus use (Table 1).

TABLE 1. PROFILE OF PARTICIPANTS: AGE AND PERCENTAGE

| Demographic characteristics | Categories | Percentage |
|-----------------------------|------------|------------|
| Age                         | 15-19      | 2          |
|                             | 20-29      | 62         |

|                        |           |    |
|------------------------|-----------|----|
|                        | 30-39     | 24 |
|                        | 40-49     | 10 |
|                        | 50-70     | 2  |
| Gender                 | Male      | 80 |
|                        | Female    | 20 |
| Frequency of using bus | Daily     | 33 |
|                        | Weekly    | 39 |
|                        | Biweekly  | 2  |
|                        | Monthly   | 20 |
|                        | Bimonthly | 5  |
|                        | Quarterly | 0  |
|                        | Yearly    | 1  |

This study observed that most of the passengers who participated in the survey were aged between 20-39. Most of the passengers who participated in the survey were male. As displayed in Table 4.3, it can be observed 33% of participants use the Uttara-Gazipur route daily and in total, 94% of participants travel along this route at least once or more in a month. Sometimes, bus services are not comfortable for female passengers in Dhaka city [9]. In each bus, just six seats have been set aside for female passengers [20][25]; however, no such seats have been set aside for people with disabilities or the elderly [26].

### B. Satisfaction on travel

#### I) Duration of time

Above 80% of passengers who participated in the survey were totally unsatisfied with the duration of time it takes to travel in the Uttara-Gazipur route, as observed in Fig. 2.

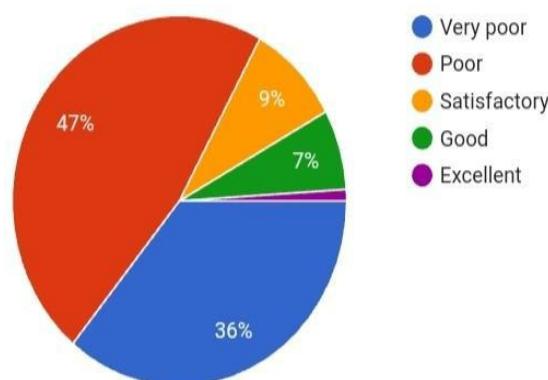
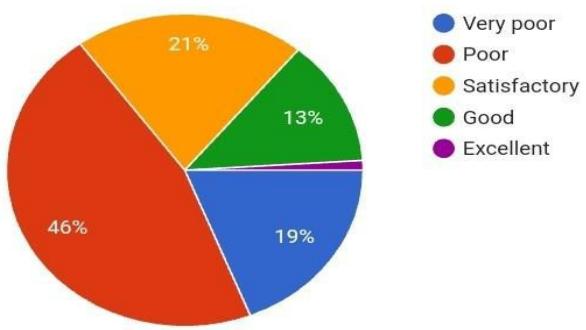


Fig. 2. Opinion about travel time in Uttara-Gazipur route

### 2) Safe speed of bus

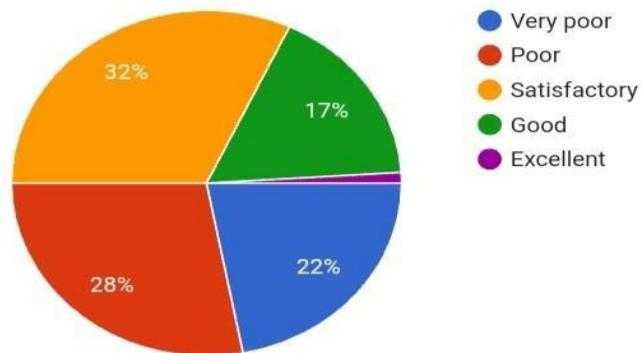
As displayed in Fig. 3, it was observed that the passengers' satisfaction with the safe speed of buses in the Uttara-Gazipur route was only 35%. It means majority of the passengers feel unsafe with the speed the buses operate on this route.



**Fig. 3.** Opinion about safe speed of bus in Uttara-Gazipur route

### C. Behavior of the bus staff

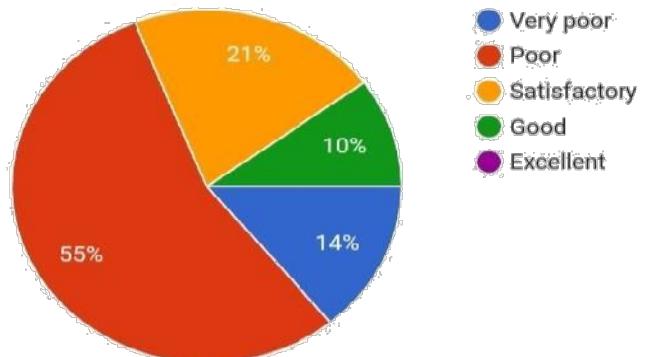
As displayed in Fig. 4, it was observed that the behavior of the bus staffs in the Uttara-Gazipur route are not up to par as 50% of the participants felt the attitudes of the staffs as unsatisfactory



**Fig. 4.** Behavior of the bus staff

### 1) Overall satisfaction of bus mode

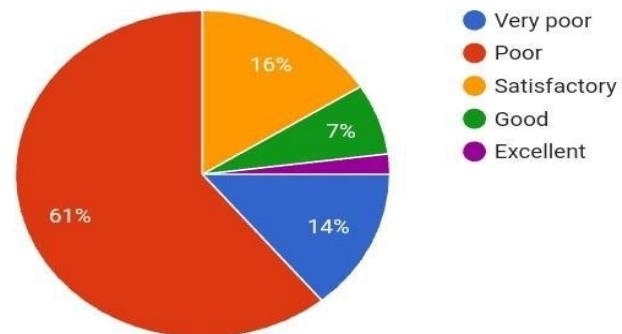
From the questionnaire survey, it was found that 69% of participants believe the consistency of bus services is poor or very poor, as shown in Fig. 5.



**Fig. 5.** Reliability of bus

### 2) Overall satisfaction of bus mode

From the questionnaire survey analysis regarding overall satisfaction of bus mode in Uttara-Gazipur route, bus passenger gave their opinion as 61% poor, 14% very poor, 16% satisfactory, 7% good and 1% excellent as shown in Fig. 6. It means 75% passengers were unsatisfied and 25% passengers were satisfied with the overall service quality of bus mode in this route.



**Fig. 6.** Overall satisfaction of bus mode

### D. Regression analysis

#### 1) Testing of null hypothesis

Perception of service quality comprising about nineteen sub-dimensions (air pollution, behavior of bus staff, cleanliness, driver experience, frequency, fitness of bus, fare, noise pollution, payment system, preferred quality of bus, reliability, safe speed, seat comfort, security of goods, sitting arrangement, station service, temperature, travel

time) does not influence passenger satisfaction in Uttara-Gazipur route [27][28][29](Table 2).

TABLE 2. REGRESSION ANALYSIS OF SERVICE QUALITY WITH PASSENGER SATISFACTION (OVERALL)

| Model 1              | P-value | F     | R <sup>2</sup> | Standard error |
|----------------------|---------|-------|----------------|----------------|
| Overall satisfaction | 0.000   | 7.872 | 0.64           | 0.571          |

As displayed in Table 2, it was observed that the p value was less than 0.05 which means if all the 18 independent variables are taken altogether into account, the prediction of level of satisfaction in model 1 comes out the satisfactory for 5% significance level. It is also observed that the value of R<sup>2</sup> is 0.64 which means the service quality can explain 64% of the variation in passenger satisfaction. Consequently, the null hypothesis is rejected, and the study concludes that service quality influences bus passenger happiness on the Uttara-Gazipur route (Table 3).

TABLE 3. REGRESSION ANALYSIS OF SERVICE QUALITY WITH PASSENGER SATISFACTION (INDIVIDUAL)

| Model 2             | B      | t       | P-value |
|---------------------|--------|---------|---------|
| Reliability         | 0.170  | 3.345   | 0.027   |
| Safe speed          | 0.240  | 2.347   | 0.021   |
| Travel time         | 0.320  | 3.345   | 0.01    |
| Air pollution       | 0.166  | 1.463   | 0.147   |
| Behavior of staff   | -0.035 | -0.365  | 0.716   |
| Cleanliness         | 0.014  | -0.167  | 0.868   |
| Driver experience   | 0.060  | 0.614   | 0.541   |
| Frequency           | 0.170  | 0.237   | 0.813   |
| Fitness of bus      | 0.096  | 1.126   | 0.263   |
| Fare                | 0.172  | 1.817   | 0.073   |
| Noise pollution     | -0.123 | -0.9994 | 0.323   |
| Payment system      | 0.047  | 0.576   | 0.566   |
| Preferred quality   | 0.073  | 0.931   | 0.354   |
| Seat comfort        | 0.052  | 0.571   | 0.570   |
| Security of goods   | -0.177 | -1.993  | 0.050   |
| Temperature         | 0.110  | 1.295   | 0.199   |
| Sitting arrangement | 0.047  | 0.501   | 0.618   |
| Station service     | 0.028  | -0.352  | 0.726   |

As displayed in Table 3, three service quality dimensions have positive and significant relationship with

passenger satisfaction ( $p < 0.05$ ), reliability ( $\beta = 0.170$ ,  $t = 3.345$ ,  $p = 0.027$ ), safe speed ( $\beta = 0.240$ ,  $t = 2.347$ ,  $p = 0.021$ ), travel time ( $\beta = 0.320$ ,  $t = 3.345$ ,  $p = 0.01$ ). This suggests that bus passengers will be happier if other aspects with significant beta coefficients are stressed more heavily [25]. Overall, this suggests that the level of customer service is a reliable indicator of passenger happiness and may account for some of the discrepancy seen [30]. Results show that there is no correlation between bus passenger pleasure and perceptions of service quality in Uttara-Gazipur, which contradicts the null hypothesis.

#### IV. CONCLUSION

The principal objective of this study is to measure comfort for buses in Uttara-Gazipur route. In order to achieve this objective, some steps were needed to be taken i.e., identifying the variables, collecting data from this route, analysing the data and finally finding out the result. There are several research studies related to reliability, cost, safe speed, fitness of bus, station service, payment system, seat comfort, air pollution, etc. This study will help identify the important variables that dominate the overall comfort value. Comfort is a significant issue in the cost-benefit analysis of transportation mode selection. This study aims to quantify the comfort of passengers of bus transport by considering the key variables that impact comfort.

The level of significance for our study was set at 5%. After conducting the analysis, it is found that the values are coherent with our 5% significance level. Hence the model is satisfactory for 5% significance level. It was also found that three parameters (reliability, safe speed and travel time) contribute individually to overall satisfaction of passenger in Uttara-Gazipur route. If more data had been collected in the survey, more accurate results would have been achieved. If the data had been taken for a longer period like six months or more then the accuracy of this study would have been much better. If the data had been taken from more locations the result would have been much better. This survey collected data through mixed methods (online and offline) because of COVID-19 situation. But it would be better if the data were taken either offline or online.

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